



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/721,606	11/22/2000	Gopal B. Avinash	390086.94677	2921

7590 10/29/2003

Adam J. Forman, Esq.
Quarles & Brady LLP
Suite 2040
411 E. Wisconsin Avenue
Milwaukee, WI 53202-4497

EXAMINER

NAKHJAVAN, SHERVIN K

ART UNIT	PAPER NUMBER
----------	--------------

2621

DATE MAILED: 10/29/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/721,606

Applicant(s)

AVINASH ET AL.

Examiner

Shervin Nakhjavan

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-17 is/are rejected.
- 7) ☒ Claim(s) 8 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

35 USC § 112 6th

1. The following is a quotation of the sixth paragraph of 35 U.S.C. 112 (See the Supplemental Examination Guidelines for determining the Applicability of 35 U.S.C. 112 6th, 65 Federal Register 38510):

112 sixth paragraph gives claims their broadest reasonable interpretation, in light of and consistent with the written description of the invention in the application. Thus, a claim limitation will be interpreted to invoke 35 U.S.C 112 6th if it meets the following 3-prong analysis: (1) The claim limitation must use the phrase "means for" or "step for"; (2) the "means for" or "step for" must be modified by functional language; and (3) the phrase "means for" or "step for" must not be modified by sufficient structure, material, or acts for achieving the specified function. With respect to the first prong of this analysis, a claim element that does not include the phrase "means for" or "step for" will not be considered to invoke 35 U.S.C 112, 6th.

2. Claims 11-17 invoke 35 U.S.C. 112, sixth Paragraph Limitation.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-7, 9 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Curwen et al. (US 5,669,382).

Regarding claims 1-7, 9 and 10, Curwen teaches, limitation of claim 1, a method for segmenting an image acquired with a medical imaging system to identify the boundary of an organ, comprising: A. acquiring image data of said organ with said medical

Art Unit: 2621

imaging system; B. reconstructing an image corresponding generally to said organ (Column 5, Lines 13-17); C. selecting a starting location on said reconstructed image within the confines of said boundary of said organ (Column 5, Lines 18-25, where the initial estimate of the perimeter of the outline is determined by selecting a polar coordinate location at the center of the organ of point 7 in column 3, Lines 1-4); D. iteratively propagating an expansion boundary around said starting location outwardly a plurality of times until it is determined that said expansion boundary has traversed said boundary of said organ (Column 5, Line 58 through Column 6, Line 12, where system iteratively propagates an expansion and upon determination of the localized energy function being below a predetermined threshold, the expansion boundary is said to be traversed said boundary of the organ or reached); and E. outputting a representation of said boundary of said organ (Column 6, Lines 17-22, where the images are displayed inherently as shown by fig. 1);

Limitation of claim 2, step C further comprises selecting a point on said reconstructed image corresponding to said image data and having a relatively high intensity (Column 5, Lines 26-39, where statistical device determines the mean pixel intensity and the standard deviation of the region after each iteration of expansion and where the starting location being the center is relatively high in intensity inherently due to localized energy function which when determined below a threshold, it is said to be the end point of the boundary reached as discussed in column 6, lines 1-5);

Limitation of claim 3, step D further comprises acquiring statistical data corresponding to said expansion boundary after each iteration (Column 5, Lines 26-39,

Art Unit: 2621

where statistical device determines the mean pixel intensity and the standard deviation of the region after each iteration of expansion);

Limitation of claim 4, the method further comprising determining that said expansion boundary has traversed said boundary of said organ based on said statistical data, wherein said statistical data includes a standard deviation of intensity values of said image data corresponding to aid expansion boundary (Column 5, Lines 26-39, where statistical device determines the mean pixel intensity and the standard deviation of the region after each iteration of expansion);

Limitation of claim 5, method further comprising determining that said expansion boundary has traversed said boundary of said organ based on statistical data including the size of said expansion boundary, and a standard deviation of intensity values corresponding to said expansion boundary (Column 5, Lines 40-56, where the perimeter or size and the standard deviations are part of statistical data generated from each generated outline);

Limitation of claim 6, step D further comprises, subsequent to each iteration: a. refining said reconstructed image to remove any fine lines and clusters of pixels not connected to said starting location (Column 5, Lines 43-50, where refining is performed by goodness function for each pixel); b. producing said expansion boundary as an outer boundary of said reconstructed image (Column 5, Lines 32-39); and c. calculating statistics pertaining to said expansion boundary (Column 5, Lines 40-43); and d. based on said statistics, determining when said expansion boundary has traversed (Column 5, Lines 58-65);

Limitation of claim 7, refining said reconstructed image prior to outputting said representation of said boundary of said organ (Column 6, Lines 17-22, where operator interaction permits further refining of the image);

Limitation of claim 9, method further comprising: F. determining that an error condition exists when at least one of the following conditions are met; 1. the size of said expansion boundary has exceeded a maximum threshold and said expansion boundary has not been determined to have traversed said boundary of said organ; and 2. a maximum number of iterations have been performed and said expansion boundary has not been determined to have traversed said boundary of said organ (Column 6, Lines 1-9);

Limitation of claim 10, said boundary of said organ is a left ventricular endocardium of a human heart (Column 2, Lines 60-67, where the endocardium is inherently identified).

5. Claims 1-5 and 11-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Kennedy et al. (US 4,961,425).

Regarding claims 1-5 and 11-15, Kennedy teaches, limitation of claim 1, a method for segmenting an image acquired with a medical imaging system to identify the boundary of an organ, comprising: A. acquiring image data of said organ with said medical imaging system; B. reconstructing an image corresponding generally to said organ (Column 5, Lines 29-32, where the organ image data is received, reconstructed and displayed to the user); C. selecting a starting location on said reconstructed image

Art Unit: 2621

within the confines of said boundary of said organ (Column 6, Lines 17-22, where a starting location is chosen or selected); D. iteratively propagating an expansion boundary around said starting location outwardly a plurality of times until it is determined that said expansion boundary has traversed said boundary of said organ (Column 6, Lines 17-30, where the expansion is propagating pixel by pixel outwardly until a predetermined difference value is determined for an outline which is inherently boundary traversing of expansion boundary for the given application); and E. outputting a representation of said boundary of said organ (Column 6, Lines 24-26, where a outline or a presentation of the boundary is produced and displayed);

Limitation of claim 2, step C further comprises selecting a point on said reconstructed image corresponding to said image data and having a relatively high intensity (Column 6, Lines 5-30, where a relatively high intensity pixel value location i.e. 80 is identified for the contour of the organ);

Limitation of claim 3, step D further comprises acquiring statistical data corresponding to said expansion boundary after each iteration (Column 6, lines 17-24, where the predetermined difference between intensity of the pixel of the selected region to the pixel in the center is determined being the statistical data);

Limitation of claim 4, the method further comprising determining that said expansion boundary has traversed said boundary of said organ based on said statistical data, wherein said statistical data includes a standard deviation of intensity values of said image data corresponding to aid expansion boundary (Column 6, lines 17-30, where the difference between the intensity value of the pixel of the candidate location to

the pixel in the center of the organ ideally is some predetermined number of the standard deviations);

Limitation of claim 5, method further comprising determining that said expansion boundary has traversed said boundary of said organ based on statistical data including the size of said expansion boundary, and a standard deviation of intensity values corresponding to said expansion boundary (Column 5, Lines 51-63, where the size of the expansion is the area of the contour being measured along with the standard deviation of the intensity of the pixels);

Limitation of system claims 11-15 corresponding to method claims 1-5 above (Column 4, Line 63 through Column 5, Line 27).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curwen et al..

Regarding claims 11-17, Curwen teaches number of limitations of the claims as discussed above according to the corresponding method claims performed by system of figure 2 in addition to discussing of MR imaging issues in Column 1, Lines 43-46 however, Curwen fails to specifically teach means for acquiring NMR image data of

Art Unit: 2621

claim 11. While Curwen fails to specifically teach acquiring NMR image data as claimed, Curwen clearly show image data acquiring by a medical imaging machine. Absent some showing of criticality or unexpected results, the exact means for image data capturing used is believed to be within the skill level of the ordinary practitioner in this art, who would find it obvious to choose the most appropriate imaging means for a given application.

Allowable Subject Matter

8. Claim 8 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not teach turning on all pixels on said reconstructed image having an intensity value greater than an intensity of said expansion boundary during a previous iteration and turning on any pixel clusters within said expansion boundary that are smaller than a predetermined threshold combined with other features and elements of the claim.

Other prior art cited

9. Prior art of record cited and not relied upon is considered pertinent to applicant's disclosure.

The US Patent 6,561,980; US Patent 6,385,332; US Patent 6,246,784; US Patent 6,081,577; US Patent 5,970,164; US Patent 5,859,891; US Patent 5,825,908; US Patent 5,782,762 and US Patent 5,239,591 variously teach segmentation and boundary

Art Unit: 2621

detection of objects or organisms related to applicant's invention as claimed which some are directly applicable as a 102 reference such as Ranganath and Hibbard.

Contact information

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shervin Nakhjavan whose telephone number is (703) 306-5916. The examiner can normally be reached on Monday through Friday from 8:00 am to 5:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau, can be reached at (703) 305-4706.

Any response to this action should be mailed to:

Assistant Commissioner for Patents
Washington, DC 20231

Or faxed to:

(703) 872-9306 for **formal** communications, please mark "**EXPEDITED PROCEDURE**"

or:

for **informal** or **draft** communications; please label "**PROPOSED**" or "**DRAFT**".

Hand delivered responses should be brought to Crystal Park 2, 2121 Crystal drive, Arlington, VA, sixth floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Tech center 2700 customer service office **(703) 306-0377**.

Shervin Nakhjavan S.N
Patent Examiner
Group Art Unit 2621
October 23, 2003.



**ANDREW W. JOHNS
PRIMARY EXAMINER**